HW Questions:

In Exercises 1–16, find dy/dx by implicit differentiation and evaluate the derivative at the indicated point.

	Equation	*Point*
1.	$x^2 + y^2 = 16$	$(3, \sqrt{7})$
3.	$xy = 4$	$(-4, -1)$
5.	$x^{1/2} + y^{1/2} = 9$	$(16, 25)$
7.	$x^3 - xy + y^2 = 4$	$(0, -2)$

9. $y^2 = \dfrac{x^2 - 9}{x^2 + 9}$ $(3, 0)$

11. $x^3y^3 - y = x$ $(0, 0)$

↖ product rule

!!

13. $x^{2/3} + y^{2/3} = 5$ $(8, 1)$

f g

15. $x^3 - (2x^2y) + (3xy^2) = 38 \quad (2, 3)$

f g′ + f′ g

$3x^2 - \left(2x^2\frac{dy}{dx} + 4xy\right) + \left(3x \cdot 2y\frac{dy}{dx} + 3y^2\right) = 0$

$-2x^2\frac{dy}{dx} + 6xy\frac{dy}{dx} = -3x^2 + 4xy - 3y^2$

$\frac{dy}{dx} = \frac{-3x^2 + 4xy - 3y^2}{-2x^2 + 6xy}$

Now plug in (2,3)

In Exercises 17–20, find the slope of the tangent line to the graph at the indicated point.

17. Witch of Agnesi:
$(x^2 + 4)y = 8$
Point: (2, 1)

$2xy + (x^2+4)\frac{dy}{dx} = 0$

$\frac{dy}{dx} = \frac{-2xy}{x^2+4}$

@ (2,1) → $\frac{-2(2)(1)}{2^2+4}$

$= -\frac{1}{2}$

19. Bifolium:
$(x^2 + y^2)^2 = 4x^2y$
Point: (1, 1)

In Exercises 25–30, find d^2y/dx^2 in terms of x and y.

25. $x^2 + xy = 5$ →

27. $x^2 - y^2 = 16$

29. $y^2 = x^3$

$\frac{xy}{x} = \frac{5 - x^2}{x}$

$y = \frac{5}{x} - x$

$y' = -5x^{-2} - 1$

$y'' = 10x^{-3}$

$y'' = \frac{10}{x^3}$ (11)

In Exercises 31 and 32, find equations for the tangent line and normal line to the given circle at the indicated points. (The **normal line** at a point is perpendicular to the tangent line at the point.)

31. $x^2 + y^2 = 25$, $(4, 3)$ and $(-3, 4)$

In Exercises 33 and 34, find the points at which the graph of the given equation has a vertical or horizontal tangent line.

33. $25x^2 + 16y^2 + 200x - 160y + 400 = 0$

~~HW: p. 148 # 1 - 11~~

HW:
Practice 3.5
3.6